North Dakota Department of Health

VIRAL HEMORRHAGIC FEVERS

The term viral hemorrhagic fever (VHF) refers to a group of illnesses caused by several distinct families of viruses. While some types of hemorrhagic fever viruses can cause relatively mild illness, many cause severe, life-threatening disease.

VHFs are caused by viruses in four distinct families: arenaviruses, filoviruses, bunyaviruses and flaviviruses. Each virus shares a number of features:

- Their survival depends upon an animal or insect host, called the natural reservoir.
- The viruses are restricted geographically to the areas where their host species live.
- Humans are not the natural reservoir for any of these viruses. Humans are infected when they come into contact with infected hosts. With some viruses, however, after the accidental transmission from the host, humans can transmit the virus to one another.
- Human cases or outbreaks of hemorrhagic fevers caused by these viruses occur sporadically and irregularly. The occurrence of outbreaks cannot be predicted easily.
- With a few noteworthy exceptions, there is no cure or established drug treatment for VHFs.

In rare cases, other viral and bacterial infections can cause hemorrhagic fever; scrub typhus is a good example.

Types of VHFs:

- Arenaviruses *(link to fact sheet)*
  - Argentine Hemorrhagic Fever
  - Bolivian Hemorrhagic Fever
  - Lassa Fever *(link to fact sheet)*
  - Lymphocytic Choriomeningitis (LCM) *(link to fact sheet)*
  - Sabia-associated Hemorrhagic Fever
  - Venezuelan Hemorrhagic Fever

- Bunyaviruses *(link to fact sheet)*
  - Crimean-Congo Hemorrhagic Fever (CCHF)
  - Hantavirus Pulmonary Syndrome(HPS) *(link to fact sheet)*
  - Hemorrhagic Fever with Renal Syndrome (HFRS)
  - Rift Valley Fever *(link to fact sheet)*

- Filoviruses *(link to fact sheet)*
  - Ebola Hemorrhagic Fever *(link to fact sheet)*
  - Marburg Hemorrhagic Fever *(link to fact sheet)*

- Flaviviruses *(link to fact sheet)*
  - Kyasanur Forest Disease

- Omsk Hemorrhagic Fever
- Tick-borne Encephalitis

Infection

Viruses associated with most VHFs are zoonotic, which means they naturally reside in an animal reservoir host or arthropod vector. They are totally dependent upon their hosts for replication and overall survival. For the most part, rodents and arthropods (such as ticks and mosquitoes) are the main reservoirs for viruses that cause VHFs. The multimammate rat, cotton rat, deer mouse, house mouse and other field rodents are examples of reservoir hosts. Ticks and mosquitoes serve as vectors for some of the illnesses. However, the hosts of some viruses remain unknown; Ebola and Marburg viruses are well-known examples.

The viruses that cause VHFs can be found around the world. Because each virus is associated with one or more particular host species, howeve, the virus and the disease it causes usually are seen only where the host species live(s). Some hosts, such as the rodent species that carry several of the New World arenaviruses, live in geographically restricted areas; therefore, the risk of getting VHFs caused by these viruses is restricted to those areas. Other hosts range across continents, such as the rodents that carry viruses that cause hantavirus pulmonary syndrome (HPS) in North and South America or the rodents that carry viruses that cause hemorrhagic fever with renal syndrome (HFRS) in Europe and Asia. A few hosts are distributed nearly worldwide, such as the common rat, which can carry Seoul virus, a cause of HFRS. Humans, therefore, can get HFRS anywhere where the common rat is found.

Although people usually become infected only in areas where the host lives, people occasionally become infected by a host that has been exported from its native habitat. For example, the first outbreaks of Marburg hemorrhagic fever in Marburg and Frankfurt, Germany, and in Yugoslavia occurred when laboratory workers handled imported monkeys infected with Marburg virus. Occasionally, a person becomes infected in an area where the virus occurs naturally and then travels elsewhere. If the virus is a type that also can be transmitted by person-to-person contact, the traveler could infect other people. For instance, in 1996, a medical professional treating patients who had Ebola hemorrhagic fever in Gabon unknowingly became infected. When he later traveled to South Africa and was treated for Ebola in a hospital, the virus was transmitted to a nurse. She became ill and died. Because more and more people travel each year, outbreaks of these diseases are becoming an increasing threat in places where they rarely, if ever, have been seen before.

Viruses that cause hemorrhagic fever initially are transmitted to humans when the activities of infected reservoir hosts or vectors and humans overlap. The viruses carried in rodent reservoirs are transmitted when humans have contact with urine, fecal matter, saliva or other body excretions from infected rodents. The viruses associated with arthropod vectors are spread most often when the vector mosquito or tick bites a human or when a human crushes a tick. However, some of these vectors may spread virus to animals such as livestock. Humans then become infected when they care for or slaughter the animals.

Some viruses that cause hemorrhagic fever can spread from one person to another once an initial person has become infected. Ebola, Marburg, Lassa and Crimean-Congo hemorrhagic fever viruses are examples. This type of secondary transmission of the virus can occur directly through close contact with infected people or their body fluids or indirectly through contact with objects contaminated with infected body fluids. For example, contaminated syringes and needles have

played an important role in spreading infection in outbreaks of Ebola and Lassa hemorrhagic fevers.

Symptoms

Specific signs and symptoms vary by the type of VHF, but initial signs and symptoms often include marked fever, fatigue, dizziness, muscle aches, loss of strength and exhaustion. Patients who have severe cases of VHF often show signs of bleeding under the skin, in internal organs or from body orifices like the mouth, eyes or ears. Although they may bleed from many sites around the body, however, patients rarely die because of blood loss. Severely ill patients may also show shock, nervous system malfunction, coma, delirium and seizures. Some types of VHF are associated with renal (kidney) failure.

Prevention

With the exception of yellow fever and Argentine hemorrhagic fever for which vaccines have been developed, no vaccines exist that can protect against these diseases. Therefore, prevention efforts must concentrate on avoiding contact with host species. If prevention methods fail and a case of VHF does occur, efforts should focus on preventing further transmission from person to person if the virus can be transmitted in this way.

Because many of the hosts that carry hemorrhagic fever viruses are rodents, disease prevention efforts include:

- Controlling rodent populations.
- Discouraging rodents from entering or living in homes or workplaces.
- Encouraging safe cleanup of rodent nests and droppings.

For hemorrhagic fever viruses spread by arthropod vectors, prevention efforts often focus on communitywide insect control. In addition, people are encouraged to use insect repellant, proper clothing, bed nets, window screens and other insect barriers to avoid being bitten.

For hemorrhagic fever viruses transmitted from one person to another, avoiding close physical contact with infected people and their body fluids is the most important way of controlling the spread of disease. Barrier nursing or infection control techniques include isolating infected individuals and wearing protective clothing. Other infection control recommendations include proper use, disinfection and disposal of instruments and equipment used in treating or caring for patients with VHF, such as needles and thermometers.

Treatment

Patients receive supportive therapy, but, generally speaking, there is no other treatment or established cure for VHFs.

For more information, call the North Dakota Department of Health at 701.328.2378.